REMARKS

Claims 1, 4-7, 9, 10, 14-16, 19-21, 30, 31, 33, and 35-41 are pending. However, the Office Action Summary does not include claim 37 in the list of pending claims. Actually, claim 37 is still pending because the last Response filed on February 8, 2005 merely amended claim 37, which has never been cancelled. In fact, the remaining obviousness rejections include the rejections of claim 37.

Applicant's Statement of Substance of Examiner Interview

The undersigned would like to thank Examiner Lee for a courteous and helpful personal interview conducted on July 27, 2005. In the interview, the undersigned argued that Jackson (US 3,847,873) would not have rendered obvious the instant claims because Example 6 presented in the table of Jackson was inferior than the Comparative Example. The undersigned also argued that Ridland (WO 99/28033) failed to render obvious the instant claims because Table 2 in page 17 of Ridland showed that Example 12 was undesirable compared with the first two catalysts of Table 2 in terms of percent conversion.

Claim Rejections Involving Jackson

Applicants respectfully traverse the obviousness rejection of claims 1, 4-6, 9, 10, 19, 30, 31, and 37-41 over Jackson (US 3,847,873).

Jackson differs from claims 1, 4-6, 9, 10, 19, 30, 31, and 37-41 at least in not teaching a polymerization catalyst for producing polyester, wherein the catalyst comprises an aluminum substance and an aromatic phosphorus compound, and wherein the aluminum substance is selected from metal aluminum, aluminum carboxylates, aluminum salts of an inorganic acid, aluminum chelate compounds, aluminum oxides and partial hydrolyzates of an organoaluminum compound.

The Office Action states that although Jackson "does not show a catalyst containing *bis*(*p*-biphenyl)phosphinate and $Al(acac)_3$ or poly(diethyl *p*-vinylphenylphosphonate) and $Al(acac)_3$, it is deemed one of ordinary skill in the art would have found it obvious to arrive at such a catalyst because each of these components is disclosed clearly in the Table. One of

ordinary skill in the art would have reasonably expected such an obvious combination to produce an effective catalyst for preparing aromatic polyesters." (Page 2 of the Office Action). Applicants respectfully disagree that it would have been obvious for a person of ordinary skill in the art to make a catalyst containing ethyl *bis*(*p*-biphenyl)phosphinate (as exemplified in Example 3) and $Al(acac)_3$ (as exemplified in Example 6) or poly(diethyl *p*-vinylphenylphosphonate) (as exemplified in Example 5) and $Al(acac)_3$ based on the disclosure in the Table of Jackson. This is because the person of ordinary skill in the art would have interpreted the Table of Jackson to mean that it would be undesirable to include an aluminum substance in the making of the catalyst of Jackson.

Example 6 is the only example in Jackson in which a catalyst was made involving an aluminum substance. Jackson's Table shows that the aluminum-containing catalyst of Example 6 had at least two disadvantages compared with the catalyst of Example 2, wherein the catalysts of both Examples 2 and 6 contained diethyl hexadecylphosphonate as the organic component.

First, the polyester produced by the catalyst of Example 6 had a lower softening point than the polyester produced by the catalyst of Example 2. Lowering "in softening point is very undesirable in a fibre forming polyester which has to meet textile requirements such as ironing and heat setting" (U.S. Patent No. 3,050,548, column 2, lines 2-4). In fact, lowering in softening point is undesirable not only in polyester destined for fiber production, it is also undesirable in polyester in general because U.S. Patent No. 4,133,800 considers an increase in softening point of polyester as an enhancement (column 1, lines 38-41). Even an increase in the softening point by a mere 0.4°C was considered to be an enhancement in U.S. Patent No. 4,133,800 {column 1, lines 38-44 and column 3, line 6; wherein the difference in the softening point between Example V (the invention of U.S. Patent No. 4,133,800), and Example IV (a comparative example in U.S. Patent No. 4,133,800) was 259.2°C - 258.8°C = 0.4°C}. When the softening point of the polyester produced by the aluminum-containing catalyst in Example 6 of Jackson is compared with that of the polyester produced by the zinc-containing catalyst of Example 2 of Jackson, the softening point in Example 6 was lower by 261.1°C - 257.2°C = 3.9°C. The lowering of the softening point by 3.9°C is significant because, as discussed above in relation to U.S. Patent No. 4,133,800, even a lowering of the polyester softening point by 0.4°C was considered undesirable

in the art. With a lowering of 3.9°C in Example 6 of Jackson, this is one of the reasons why a person skilled in the art would not use aluminum-containing catalysts in the polyester production.

Second, the polyester produced by the catalyst of Example 6 was darker (L = 75.5) than the polyester produced using the catalyst of Example 2 (L = 79). Polyesters having high L values are white and bright, while polyesters having low L value are gray and dark. The darker polyester produced using the catalyst of Example 6 is undesirable because of discoloration. The discoloration in polyester contaminates the color of articles manufactured with the polyester and also makes it difficult to manufacture colorless polyester articles. This is another reason why the person of ordinary skill in the art, in reading Jackson, would not have used aluminum-containing catalysts in preparing polyester. In other words, the catalyst of Example 6 of Jackson produced polyester of inferior quality.

Because of increased darkness and undesirable lowering of the softening point of the polyesters produced using the catalyst of Example 6, the person of ordinary skill in the art would have concluded that aluminum substance should not be combined with an organophosphorus substance in making polymerization catalysts for polyester preparation. In contrary to the assertion in the Office Action: "[o]ne of ordinary skill in the art would have reasonably expected such an obvious combination to produce an effective catalyst for preparing aromatic polyesters", one of ordinary skill in the art would have reasonably expected the combination to be **NOT** an effective catalyst for preparing polyesters. There would have been no motivation to modify the catalysts exemplified in Jackson's Table to make a catalyst containing ethyl *bis*(*p*-biphenyl)phosphinate and $Al(acac)_3$ or poly(diethyl *p*-vinylphenylphosphonate) and $Al(acac)_3$ or containing an aluminum substance and an aromatic organophosphorus compound for polyester preparation. Therefore, claims 1, 4-6, 9, 10, 19, 30, 31, and 37-41 would not have been obvious over Jackson.

Although Jackson discloses that Zn or Al can be used in polycondensation catalyst for making polyester (column 3, lines 55-56), applicants note that almost all polyester produced commercially has been polymerized using Sb, Ti or Ge catalyst, and catalysts containing Zn or Al have not been used.

Because the claimed invention would not have been obvious over Jackson, and because Aoyama et al (CA 2,253,515) fails to cure the deficiencies of Jackson, applicants respectfully

request that the obviousness rejection of claims 7, 14-16, 20, 21, 33, 35 and 36 over Jackson in view of Aoyama et al be withdrawn.

Claim Rejection Involving Ridland

Applicants respectfully traverse the obviousness rejection of claims 1, 4-7, 9, 10, 14-16, 19-21, 30, 31, 33, 35, 36 and 38-41 over Ridland (WO 99/28033).

Ridland differs from claims 1, 4-7, 9, 10, 14-16, 19-21, 30, 31, 33, 35, 36 and 38-41 at least in not teaching a polymerization catalyst for producing polyester, comprising an aluminum substance and an aromatic phosphorus compound, wherein the aluminum substance is selected from metal aluminum, aluminum carboxylates, aluminum salts of an inorganic acid, aluminum chelate compounds, aluminum oxides and partial hydrolyzates of an organoaluminum compound.

The Office Action asserts that it would have been obvious to use a combination of aluminum *sec*-butoxide (exemplified in Example 12) and an aryl phosphonate or aryl phosphinate because one of ordinary skill in the art "would have expected such a catalyst to perform equally well in producing polyester." Applicants respectfully disagree based on the reasoning presented below.

Example 12 is the only example of Ridland that uses a catalyst made of an aluminum substance, i.e. aluminum *sec*-butoxide, and an organophosphorus compound, i.e. butyl phosphate. The performance of the catalyst of Example 12 in an esterification reaction was compared with the performance of two comparative examples: antimony oxide or titanium isopropoxide alone (see Example 16, pages 15-16, Ridland). The comparative data are shown in Table 2 of Ridland. Table 2 shows that the catalyst of Example 12 (made with aluminum *sec*-butoxide, butyl phosphate, diethylene glycol and sodium hydroxide) achieved a very low percent conversion, merely 50.44%, than that of the two comparative examples. The 50.44% conversion achieved by the catalyst of Example 12 was only about 3/4 of that achieved by antimony oxide (66.16%) and about 1/2 of that achieved by titanium isopropoxide (99.39%). The much lower percent conversion achieved by the catalyst of Example 12 means more waste of the starting materials.

Usually, polyester has at least 100 repeating units, e.g. ethylene terephthalate, and at least 200 ester bonds. The 50.44% conversion means that 49.56% of the starting carboxylic acid is not reacted with the starting ethylene glycol. One of ordinary skill in the art would believe that

the starting materials would not grow into polyester if the catalyst of Example 12 is used for producing the polyester. Thus, Table 2 shows that the catalyst of Example 12 was significantly inferior than the catalysts of the comparative examples, even though Ridland states that the "results demonstrate that the catalyst of the invention are effective for the esterification reaction of benzoate esters" (page 18, Ridland). Applicants note that among all the catalysts compared in Table 2 of Ridland, Example 12 had the lowest percent conversion. Even if Example 2 is compared with Examples which are not comparative examples, Example 12 had the lowest percent conversion. The catalyst components of these Examples are shown in the table below.

Example	**Metal Component of Catalyst**	**Phosphate Component of Catalyst**
8	titanium n-butoxide	PEG phosphate
9	titanium n-butoxide	dibutyl phosphate
10	polybutyl titanate	butyl phosphate
11	zirconium n-propoxide	butyl phosphate
12	aluminum sec-butoxide	butyl phosphate
13, 14	titanium n-butoxide	butyl phosphate
5	titanium n-butoxide	aryl PEG phosphate
3	titanium n-butoxide	mono- and di-butyl acid phosphates

Similar to the conclusion when a person skilled in the art is reading Jackson, Table 2 of Ridland shows that a catalyst containing aluminum is inferior than catalysts containing other metals in terms of percent conversion.

In addition, the catalyst of Example 12 resulted in a product having a cloudy white color (see Table 2), which cloudy white product is not as desirable as the colorless products achieved with other examples.

In reviewing Ridland, a person of ordinary skill in the art would have reasonably concluded that catalysts made of an aluminum substance and an organophosphorus compound would be inferior than the prior art antimony oxide catalyst or titanium isopropoxide catalyst, or a catalyst made from a titanium or zirconium compound and an organic phosphate.

Thus, there would have been no motivation for a person of ordinary skill in the art to make a polymerization catalyst containing an aluminum substance and an organophosphorus compound, let alone containing an aluminum substance and an aromatic organophosphorus compound. Therefore, claims 1, 4-7, 9, 10, 14-16, 19-21, 30, 31, 33, 35, 36 and 38-41 should not have been rejected as obvious over Ridland.

Withdrawal of the obviousness rejections is requested.

CONCLUSION

In view of the above reasoning, applicants submit that the application is in a condition for allowance.

The Examiner is invited to contact the undersigned to discuss any matter regarding this application.

In the event that the filing of this paper is deemed not timely, applicants petition for an extension of time. The Commissioner is authorized to charge the petition fee and any fees required in relation to the filing of this paper or credit any overpayment to Deposit Account No. 11-0600.

Respectfully submitted,

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Enclosures: U.S. Patent Nos. 4,133,800 and 3,050,548

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